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Does density matter in neighbourhood satisfaction? A multi-level analysis of the Helsinki metropolitan area

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ABSTRACT

In this article, we look at the role of density in neighbourhood satisfaction. Our context is a Nordic capital area experiencing increasing densification and growing segregation. In theory, given internationally low segregation levels and preventive segregation management, it could be expected that neighbourhood satisfaction would not show significant variation across neighbourhoods in the Helsinki metropolitan area. However, our findings suggest that spatial variation in neighbourhood satisfaction persists despite equalising measures. It is associated with neighbourhood density: after controlling for neighbourhood centrality, neighbourhood satisfaction declines as density increases. This association seems to be mediated by population composition and tenure structure. Understanding the role of density in neighbourhood satisfaction and subjective well-being is crucial for assessing the societal implications of the current planning paradigm of densification. As residential perceptions form part of segregation dynamics, subjective experiences across different social and spatial contexts, particularly negative ones, can help understand and potentially mitigate segregation trajectories.

KEYWORDS: Neighborhood satisfaction; density; densification policies; neighbourhood effects; segregation; Helsinki metropolitan area

Introduction

In the 2000s, densification became a leading planning paradigm in OECD countries. Synonyms for densification include 'compact cities' (Burton, 2000; Dempsey & Jenks, 2010; McFarlane, 2023) and transit-oriented development (e.g., Cervero et al., 2002). Dense urban structure has been argued to

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provide economic (see, e.g., Glaeser & Edward, 2011), environmental (Rogers, 1999), and social benefits through inclusiveness (Fainstein, 2010; Harvey, 1973). On the other hand, the adverse social impacts of densification have received increasing attention in recent years (Cavicchia, 2021; Le Boennec & Lucas, 2022; Rice et al., 2020).

Campbell (1996) describes the planner's difficult role in addressing sustainability conflicts. In the 'planner's triangle' (1996), sustainability lies at the balance point of the triangle. At the triangle's corners, social justice competes with both economic growth and environmental concerns. In this article, we take a social perspective and focus on the role of density in neighbourhood satisfaction, considering its implications for long-term segregation development. Densification and desegregation can even be seen as conflicting urban policy goals, as densification strategies in the Helsinki region target accessible areas with a lower socioeconomic status and a higher share of social housing (see e.g., Rosengren et al., 2024).

Our study is situated in the context of a Nordic welfare state's capital region, where both urbanisation and segregation are 'soft' and lag behind those of European countries. Helsinki particularly has a long history of both preventive and reactive desegregation measures (Ruonavaara et al., 2025). However, despite policies aiming otherwise, segregation in the Helsinki metropolitan area has grown in the 2000s (Kauppinen & Mukkila, 2022; Kurvinen et al., 2025). Rather than densifying, the region has expanded in built-up area in the early 2000s (Tiitu, 2018). The central question regarding the efficacy of both densification and desegregation policies is how they regulate market-driven residential mobility patterns. Higher income groups may choose to trade off living in a central, socially mixed location for perceived safety (Sallis et al., 2011), more green space (Crawford et al., 2008; Schüle et al., 2017; Wen et al., 2013) or satisfaction with leisure (Mouratidis, 2019). In other words, suburban locations may be perceived as better neighbourhoods for various reasons and attract the well-off, despite urban policies aimed at curbing sprawl.

One factor in selective mobility is neighbourhood satisfaction and, more widely, neighbourhood effects. Neighbourhood effects research has predominantly focused on individuals' objective outcomes, such as education, rather than subjective outcomes such as neighbourhood satisfaction. Theoretically, the article links neighbourhood satisfaction with neighbourhood effects studies. As residential perceptions form part of the segregation cycle, identifying subjective experiences across different social and spatial contexts, particularly negative ones, can help understand and potentially mitigate segregation trajectories. Our results can be applied in segregation policies such as social mixing and area-based initiatives. Understanding density's role in residential perceptions of neighbourhoods is crucial for considering the societal implications of the current planning densification paradigm, and our results can be applied to land-use policy, particularly densification strategies.

We ask the following research questions: (1) How does density predict neighbourhood satisfaction? Further, we ask (2) whether the results differ by centrality and (3) whether controlling for sociodemographic background, housing, and neighbourhood characteristics helps to explain possible differences.

Helsinki metropolitan area provides an interesting case setting for two reasons. Firstly, the welfare 'safety net' has equalised socioeconomic structure historically, a known factor of neighbourhood satisfaction (Lu, 1999; McCulloch, 2012; Mohan & Twigg, 2007; Sampson, 1991; Stipak & Hensler, 1983). The question here is to what extent this applies to welfare states with small income differences. Secondly, social mixing strategies implemented since the 1960s have equalised tenure and socioeconomic structure spatially across neighbourhoods, one reason behind the internationally low segregation levels (Andersen et al., 2013). Tenure plays a role in neighbourhood satisfaction (Rosengren & Kauppinen, 2024). With preventive social mixing strategies and reactive area interventions targeting socioeconomic gaps, it could be expected that neighbourhood satisfaction would not show significant variation between neighbourhoods in this region. However, our findings show that variation exists. Few neighbourhood satisfaction studies have concentrated on areas with small income inequalities, low segregation, and an established social mixing policy.

The article proceeds as follows. The first section looks at the role of neighbourhood effects in the segregation process. We then link neighbourhood satisfaction with neighbourhood effects theory. The third section builds a conceptual framework linking neighbourhood satisfaction to segregation through mechanisms of neighbourhood effects. We then look at the context of the Helsinki metropolitan area. In our empirical section, we present the results of our quantitative analysis in three steps: the relationships among neighbourhood satisfaction, density, and urban structure; the predictive role of density in neighbourhood satisfaction and the mediating factors; and the role of centrality. In the end, we reflect on our findings relative to urban policy.

Theoretical framework

Segregation, neighbourhood effects, and neighbourhood satisfaction

Segregation can be defined neutrally, as Massey and Denton (1988) define it: *'the degree to which two or more groups live separately from one another, in different parts of the urban environment'* (Massey & Denton, 1988). In this article, segregation is seen as an adverse societal process. Societal structures allow for the clustering of disadvantage (Slater, 2013). On the individual level, segregation may affect life chances for employment or education through the neighbourhood effects. On a societal level, segregation hinders democracy and spatial justice in the built environment, the labour market, and the housing market (Tunström et al., 2016, p. 37).

In a welfare state, segregation also profoundly challenges the welfare state ethos and its related urban policy (Kauppinen, 2002, p. 179; Tunström et al., 2016, p. 7; Wessel et al., 2017).

A belief in the direct impact of neighbourhood conditions on individuals, neighbourhood effects, is the cornerstone of the two most widely applied place-based anti-segregation policies, social mixing and area-based initiatives. Establishing causality has, however, proved challenging and would require experimental or quasi-experimental settings (e.g., Chetty et al., 2016; Chyn & Katz, 2021). An important reason is self-selection, as individuals may choose neighbourhoods or end up in them based on factors that can also directly influence the study's outcomes. This 'sorting' process is influenced by various push and pull factors and differences in households' resources.

Experimental and quasi-experimental studies have been conducted particularly in the USA, and they have demonstrated, for example, effects of neighbourhood poverty or income level on outcomes such as children's later life chances and adults' physical and mental health (e.g., Chetty et al. 2016; Chetty & Hendren 2018; Chyn, 2018; Katz et al. 2001; Ludwig et al. 2012). Social processes are often suggested to mediate the effects. For example, in a study analysing an outcome closer to neighbourhood satisfaction, Algan et al. (2016) found that among public housing tenants in France, higher local ethnic diversity leads to deterioration of the perceived housing environment, and they suggest that higher diversity reduces the emergence of shared social norms and social engagement with neighbours, and this reduces collective action to pressure the public housing administration to improve the environment.

Neighbourhood satisfaction, the 'degree of fit' between an individual's aspirations and actual residential circumstances (Campbell et al., 1976; Galster, 1987), can both be affected by the neighbourhood characteristics and affect the sorting into neighbourhoods. Neighbourhood satisfaction is regarded as a crucial factor influencing relocation decisions, especially in urban environments (Diaz-Serrano & Stoyanova, 2010; Speare, 1974). 'Housing stress' (see e.g., Brown & Moore, 1970) can emerge from both internal changes, such as shifts in household composition over time, as well as external influences, affecting residents' decisions to move (Permentier et al., 2011). As wealthier residents relocate, neighbourhoods can become less diverse, leading to increased concentrations of specific social or ethnic groups. Even in welfare states, structural inequalities or uneven urban policy may lead to the out-movement of the middle classes, whilst locking the most vulnerable in place. For example, Kemppainen et al. (2020) found that a significant portion of post-WWII residents in Finland were involuntary stayers due to limited resources, such as financial or health-related constraints.

The direct role of the environment is difficult to define in a socially and physically complex urban setting, complicating the isolation of neighbourhood effects. An example of this is residential density. Density is

closely connected to other variables influencing neighbourhood satisfaction, such as walkability (Dyck et al., 2011; Grasser et al., 2016), building height (Bramley et al., 2009), services, noise levels (Lovejoy et al., 2010), traffic (Hur & Morrow-Jones, 2008), or green space (Björk et al., 2008; de Jong et al., 2012; Lovejoy et al., 2010; Parkes et al., 2002). For example, Howley et al. (2009) argues that high density in itself is not a source of dissatisfaction for respondents: instead, other related factors such as environmental quality, traffic, noise, lack of community involvement, or lack of services and facilities may be involved. Similarly, Lee (2017) argues that possible reasons for a negative relationship between high residential density and neighbourhood satisfaction may be a loss of feelings of control and safety, pointing to the importance of perceptions in individuals' evaluations, discussed in the next section.

Despite these limitations, neighbourhood effects remain the underlying assumption behind the two place-based policies widely employed to combat segregation: social mixing and area-based initiatives. Social mixing is the mixing of different social, demographic, and cultural groups in housing, often *via* tenure mixing. Promoting social mixing involves reducing the concentration of deprivation in specific areas to counter segregation and its adverse effects. While social mixing is embedded in Nordic urban planning and executed in a somewhat automated way in larger Finnish cities (Rasinkangas et al., 2023), its efficacy is unclear. This could be for several reasons: firstly, the (positive) neighbourhood effects that social mixing and area-based interventions aim to produce are difficult to isolate, as discussed earlier. Secondly, welfare states that use these policies lack reference points: social outcomes without them remain unknown. Lastly, the lack of the subjective dimension in neighbourhood effects studies may lead to a limited view of the efficacy of social mixing or area-based interventions on individuals' cognitive assessment of their neighbourhoods. Therefore, a better understanding of how residents perceive their neighbourhoods could improve the knowledge of the segregation dynamics.

The role of the neighbourhood in individuals and societal processes

This article argues that residential perceptions should be more firmly embedded in neighbourhood effects theory. We use Galster's neighbourhood effects mechanisms (2012) as a general framework for understanding how the neighbourhood can affect individuals, and expand on this with subjectively measured outcomes. This enables a more comprehensive view of the interrelations among urban factors and individual outcomes, as well as between objective dimensions (individual life chances) and subjective dimensions (individuals' perceptions of their living environment).

Galster (2012) identifies various causal pathways connecting neighbourhood context to individual outcomes. First, social-interactive mechanisms influence processes impacting individuals' objective outcomes, such as social cohesion and collective socialisation. Second, environmental

mechanisms play a role in residents' exposure. Third, geographical mechanisms relate to the location of neighbourhoods and affect individuals. Lastly, institutional mechanisms influence local resources and can lead to external stigmatisation of neighbourhoods. The mechanisms through which urban social or physical characteristics affect individual outcomes cannot be considered rigid classifications.[1]

Figure 1 expands individual outcomes to include dimensions of the 'perceived' city. In addition, we view outcomes measured on a subjective and objective level as influencing each other. Such subjectively measured factors could include neighbourhood satisfaction, the focus of this article, neighbourhood attributes such as perceived safety, or broader subjective perceptions such as quality of life.

The effects of neighbourhoods are often described on a neighbourhood-to-individual scale. However, these levels are not independent of the broader society behind them. Neighbourhood dynamics are intertwined with broader societal structures and individual factors, requiring consideration of regional and state levels in discussions of segregation. Sampson (2019) outlines three interconnected levels in neighbourhood effects: overarching societal structures, neighbourhood-specific dynamics, and individual behaviours, each influencing the others. Individual-level actors, such as selection and choices, cognition, abilities, perceptions, and sorting patterns, feed into the two former levels. Over a longer timeframe and in a broader context, individual-level outcomes may also contribute to the urban factors underlying neighbourhood effects through societal changes, such as selective migration patterns that drive segregation, gentrification, or the marginalisation of specific population groups. Therefore, we add a link from the individual level back to the urban level in Figure 1 and use

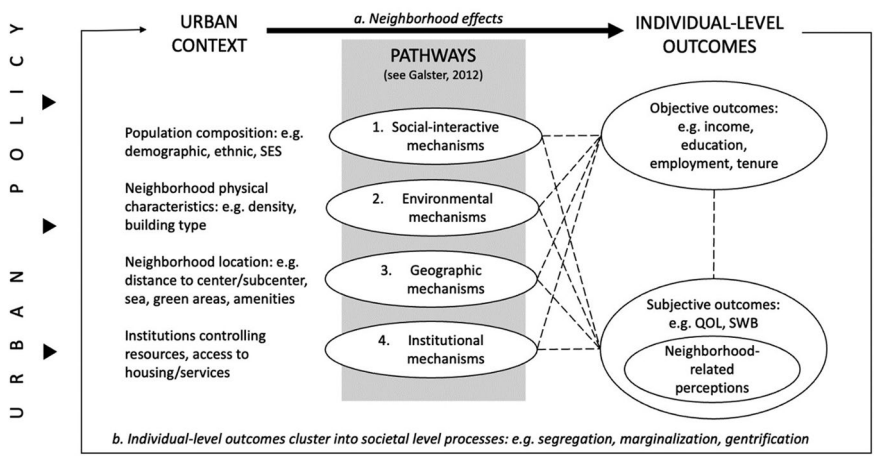

Figure 1. The framework of neighbourhood-effect mechanisms presented by Galster (2012), applied to a wider range of outcomes, including neighbourhood satisfaction.

it to argue for the societal impact of individual outcomes, measured both objectively and subjectively. This feedback loop can be mitigated through urban policies, as discussed later.

Factors of neighbourhood satisfaction

At the neighbourhood level, neighbourhood socioeconomic status (SES) is perhaps the most agreed-on factor affecting neighbourhood satisfaction (McCulloch, 2012; Mohan & Twigg, 2007; Sampson, 1991; Stipak & Hensler, 1983). Neighbourhood physical factors are often entwined with SES. For example, residents from high-income neighbourhoods have reported more favourable aesthetics, pedestrian/biking facilities, safety from traffic, safety from crime, and access to recreation facilities than residents of low-income areas (Sallis et al., 2011). Different socioeconomic groups may also be more capable of taking advantage of available opportunities (Sen, 1993; see also 1980). Neighbourhood SES is closely related to other social factors, such as tenure. On an individual level, homeowners are likely to have a more extensive selection of options in the housing market and thus be more successful in obtaining an environment leading to satisfaction experiences (Lu, 1999; Parkes et al., 2002). Homeowners have a larger investment in housing, and their satisfaction is more affected by neighbourhood characteristics than in other tenures (Boschman, 2018), and they may also prefer a homogenous neighbourhood: homeowners' satisfaction declines as their share declines (Parkes et al., 2002).

High residential density has been linked to lower neighbourhood satisfaction. (Baldassare, 1982; Bramley et al., 2009; Lee & Guest, 1983; McCulloch, 2012). Some studies have found factors offsetting the negative relationship between high density and neighbourhood satisfaction, such as higher service levels in central locations (Kyttä et al., 2016). Schmidt-Thomé et al. (2013) found that neighbourhood attractiveness increased residents' acceptance of higher densities. In Oslo, Mouratidis (2018) found that neighbourhood satisfaction was positively influenced by population density, which in turn was linked to accessibility. On the other hand, studies in the Helsinki region have found evidence of strong social-interactive mechanisms that affect perceptions of the neighbourhood, which can override the benefits of accessibility: for example, Kortteinen et al. (2005) found that accessibility (services, transport) played only a minor role in neighbourhood satisfaction in the socioeconomically weakest neighbourhoods, whereas neighbourhood social characteristics were decisive. Kemppainen (2017) found that residents in Finland considered low-rise neighbourhoods to be significantly more peaceful than multi-story neighbourhoods and that perceived disorder was linked to both tenure and socioeconomic structure.

In neighbourhood satisfaction, perceptions matter: subjectively measured factors (e.g., perceived disturbances from noise, pollution, or crowding) are more closely linked to other perceived variables, such as

neighbourhood satisfaction, as they are seen through the same lens (Marans & Rodgers, 1975; Parkes et al., 2002). For example, perceptions of maintenance and neighbourhood satisfaction are strongly linked (Dyck et al., 2011; Howley et al., 2009; Hur & Morrow-Jones, 2008). Other factors include actual or perceived safety (Basolo & Strong, 2002; Bruin & Cook, 1997; Dyck et al., 2011; Hipp, 2009; Howley et al., 2009; Hur & Morrow-Jones, 2008; Leslie et al., 2010; Lovejoy et al., 2010), peacefulness (Le Boennec & Lucas, 2022), social control (Hipp, 2009; Markowitz et al., 2001; Sampson & Groves, 1989), cohesion (Howley et al., 2009) and social ties, in turn, are often related to the duration of residence (Sampson, 1991; Woldoff, 2002).

Lastly, it should be stressed that while neighbourhood characteristics play a role in determining perceived satisfaction, their direct effect on personal and psychological factors has also been relatively weak. For example, in a meta-analysis of neighbourhood satisfaction studies, Neal (2021) found that objective neighbourhood features account for only a fraction of the variation in neighbourhood satisfaction. Personality and psychological factors had a much more direct impact on neighbourhood satisfaction and subjective well-being more generally (Neal & Brutzman, 2023). Individual-level characteristics affecting neighbourhood satisfaction include age (Lu, 1999; Parkes et al., 2002; Permentier et al., 2011), household composition or income (McCulloch, 2012) and tenure (Bramley et al., 2009; Hipp, 2009; McCulloch, 2012; Parkes et al., 2002). These findings suggest that policies affecting the physical or social local environment may have little impact on perceptions, as the mechanisms through which perceptions are formed operate at a deeper, individual level. Therefore, neighbourhood perceptions could be altered more effectively through people-based policies, such as addressing the structural factors underlying residential segregation patterns.

Context: the physical and social growth of the Helsinki metropolitan area

The population of the Helsinki metropolitan area[2] was approximately 1.2 million in 2025. Helsinki's growth has been among the fastest in European capitals (Helminen, 2014). Urbanisation in Finland happened relatively late on a European scale (Finnish Ministry of the Environment, 2015). Migration into cities in the 1960s and 1970s shifted many Finns from an agrarian lifestyle to urban living. This was marked by the birth of the 'forest suburb': a construction boom of prefabricated multi-story block housing away from city centres, with direct access to nature. Despite the increasing dominance of multi-story housing in the Helsinki metropolitan area (hereafter: HMA)[3], surveys indicate a preference for single-family housing close to nature, with good services and accessibility, and with opportunities for outdoor leisure activities, social contacts, and safety. Figure 2 illustrates the urban structure of the HMA.

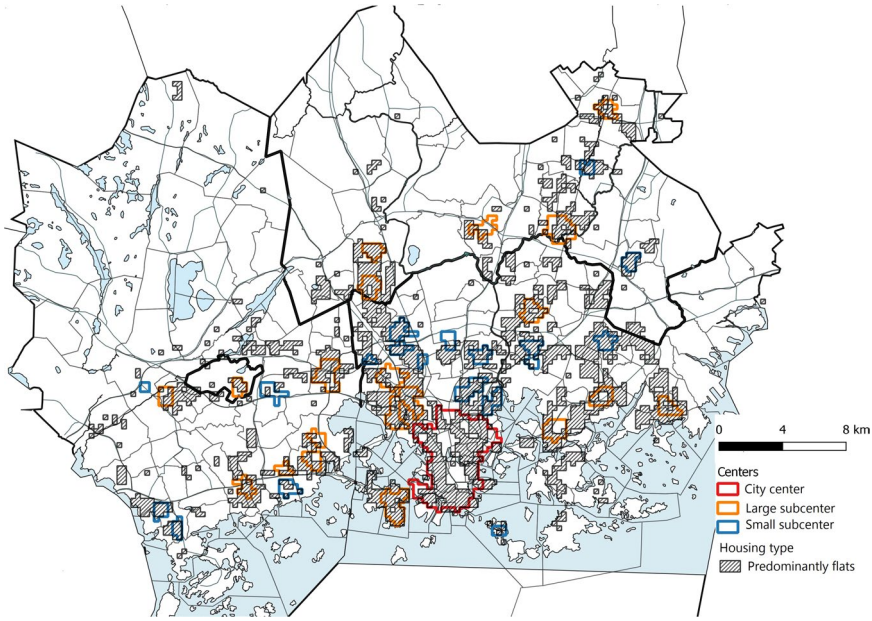

Figure 2. The urban structure of the Helsinki metropolitan area.

Densification efforts have worked to some extent: for example, the population of the central core has grown in the 2010s. On the other hand, urban expansion and the loss of green areas have continuously posed a problem for planners (Tiitu, 2018). The Helsinki region only started to densify in the 2010s and still has lower densities and a more dispersed workplace structure than, for example, Oslo (Tiitu et al., 2021). Curbing segregation has posed another problem: levels have continued to rise throughout the 2000s (e.g., Kurvinen et al., 2025). Poor perceptions or the fear of adverse neighbourhood effects may affect moving preferences (Kortteinen et al., 2005) or moving intentions (Permentier et al., 2011), inducing detrimental 'sorting' patterns: those with the most resources avoid accumulating disadvantage and stigmatisation by moving, further skewing social structure to a more disadvantaged direction over time (Vilkama et al., 2016).

In addition to where this residential segment has moved to, an equally important question is where they have moved *from* and what this out-movement has caused in these vulnerable neighbourhoods. In the case of Finnish 'forest suburbs,' it has meant a socioeconomic decline and ethnic diversification (Stjernberg, 2019). Segregation in the HMA is tied, if not directly to density, then to accessibility, housing types, and tenure. Accessible areas have a lower socioeconomic status and a higher share of social housing (see e.g., Rosengren et al., 2024). Kauppinen and Mukkila (2022) found that rising income inequality in the 2000s was associated with housing type (dominance of apartment buildings) and tenure (social

rental housing). Similarly, building age could be related to income: neighbourhoods built between the 1970s and 1990s, with immigrant populations and elderly residents, were associated with lower income.

Research design

We define 'neighbourhood' as an administrative sub-area within the HMA. This is the smallest available comparable entity, providing enough respondents per neighbourhood[4]. The analysis first treats the HMA, consisting of four municipalities, as a single entity. However, we hypothesise that the centre may differ from other high-density areas regarding neighbourhood satisfaction (hereafter: NS), as it differs in social structure[5] and therefore concentrate only on the remainder of the HMA—the suburban zone—in the second stage. In the third stage, we further narrow the analysis to subcenters within the suburban zone with higher density and lower socioeconomic status.

We use survey data from the Regional Health and Wellbeing study (2012–2015 responses pooled), collected by the Finnish Institute for Health and Welfare via a national postal and web-based questionnaire, using stratified random sampling. In the HMA, some 21,900 valid responses were collected from 2012 to 2015[6]. Survey responses were combined with Finnish Population Register Data, the National Housing Register, and ARA (social housing) housing register. Because survey responses were geocoded, we could allocate responses to neighbourhoods and other spatial entities using open data from the Finnish Environment Institute, Statistics Finland, and HSY Regional Information. Variables measuring the housing and population composition of the neighbourhoods were created from full-population individual-level register data from Statistics Finland[7].

The main variables in the analysis are density (primarily measured as residents per hectare) and neighbourhood satisfaction (hereafter: NS). NS is calculated in the study using a global question: 'How satisfied are you with the conditions of your neighbourhood?' The response options ranged from 1 (very dissatisfied) to 5 (very satisfied). In descriptive analyses, we treated this Likert-style variable as continuous to simplify the analysis, but in statistical modelling as ordinal. We relied on respondents' interpretations of the term 'neighbourhood', linking the responses to factors measured at a geographic scale larger than block-level but smaller than postcodes.

In addition to the main explanatory and outcome variables, we measured neighbourhood and individual-level factors that could either confound the association between observed density and responses to the NS question by affecting both of them (centre type/distance, construction period of housing stock, and individual-level sociodemographic characteristics) or mediate the potential effect of density on NS (other housing characteristics and the neighbourhood's population composition). The selection of these variables was based on prior research on factors affecting residential density and NS, as well as on known associations among

neighbourhood-level characteristics. The descriptive statistics for the variables are shown in Supplementary Appendix Table 1.

Descriptive analyses were done using SPSS 16.0. The modelling of NS was done by conducting multi-level ordered logistic regression analyses using the *meologit* command in Stata 18 (StataCorp, 2023). In this analysis, we combined the three lowest NS categories (1–3) due to low response rates in those categories. Hence, the models had three outcome categories: Not satisfied (including those who responded 'very dissatisfied' or 'not satisfied or dissatisfied'), relatively satisfied, and very satisfied. A more detailed version with four categories did not produce significant new findings.

Figure 3 shows how the research design is linked to the theoretical framework and how the modelling proceeds. Because other factors could create an observable association between density and NS by affecting both, we first attempted to eliminate the contributions of potential confounders to the association. Then, we examined how potential mediators help explain the residual association between density and NS. Here, the selection of variables is guided by theories of possible mechanisms underlying neighbourhood effects. However, the research design is not causal, so the findings must be interpreted as conditional associations between density and NS, conditional on observed and controlled relevant factors. The potential for other unobserved factors to change the results remains.

Our primary research question about the connection between residential density and NS is related to the environmental mechanisms of

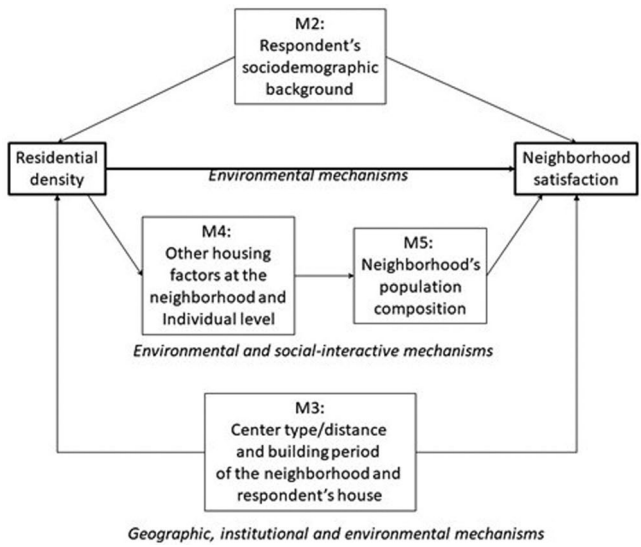

Figure 3. Analysis framework and addition of variable groups to different models in the analysis, grouped according to neighbourhood-effect mechanisms that they are expected to be related to.

neighbourhood effects (Galster 2012), as residential density is one of the physical aspects of the neighbourhood environment. The first regression model measures the unadjusted association between density and NS. We then control for factors that might *confound* this association by affecting residential density and NS. First, in Model 2, we control for individual-level sociodemographic factors that can affect both selection to different neighbourhoods (and that way residential density) and answers to the NS question. The survey data provided background information on the respondents, of which we used gender, age, employment status[8], and household size.

In Model 3, we additionally control for neighbourhood-level factors that may affect both residential density and NS: centre type (and distance to centres) and the neighbourhood's mean construction period for dwellings. These factors could affect NS through geographic and environmental mechanisms. Part of the significance of residential density for NS may lie in its mediation of the effects of these confounding factors on NS. We also control for the construction period of the respondent's dwelling in this model. This is because we have chosen to control for similar housing factors simultaneously at the neighbourhood and individual levels, as controlling for only one might indirectly reflect the effects of the other due to their correlation. Results for Model 3 are expected to demonstrate how residential density is associated with NS, in addition to the effects of neighbourhood centrality and housing construction periods.

Models 4 and 5 look at how different factors *mediate* the remaining association between residential density and NS. In Model 4, we control for the share of state-subsidised rental housing in the neighbourhood and the respondents' housing tenure and dwelling type. The rationale for considering the neighbourhood's housing tenure composition to mediate the effect of residential density is that subsidised rental housing has been built mainly in densely built neighbourhoods (where density was determined first). The characteristics of the respondent's dwelling may reflect the effects of the dwelling's proximate environment, which can be seen as a mediating factor between the characteristics of the larger neighbourhood and NS, and this is an additional reason we control for them in this model rather than in Model 2.

In Model 5, we add the final variable, measuring the socioeconomic and ethnic composition of the neighbourhood population using a summary variable constructed as the average of standardised shares of the low-income rate of the population and the share of 'non-Western' immigrants[9] as a control variable. We expect the potential significance of the share of state-subsidised housing to be related to its effect on population composition, which is why we see population composition as a mediating factor. It could also mediate the impact of residential density in ways beyond the effect of housing tenure composition, if different residential densities attract different populations. The factors measured in Models 4 and 5 relate to a potential social-interactive mechanism in which housing stock affects population composition, and residents may respond to the resulting

composition. Housing characteristics could also operate through environmental mechanisms, for example, if subsidised rental housing differs physically from other tenure types and this difference affects NS.

Results

How are density and NS related to urban factors?

Neighbourhood satisfaction across the metropolitan area is generally relatively high. On a scale of 1–5, residents rate their satisfaction with neighbourhood conditions at approximately 4.04. Variation in NS was larger at the individual (std. dev. 0.82) than at the neighbourhood level (std. dev. 0.23), which was expected[10]. At the individual level, homeowners are more satisfied with their environments, and lower NS can be pinpointed to those living in subsidised housing (students were an exception to this). As for density, respondents living in low-rise housing were more satisfied with their neighbourhoods than those living in multi-story buildings.

Neighbourhood satisfaction ranges from 3.50 to 4.67 across neighbourhoods. The highest NS was in the centre, which also differs in density from other surrounding zones: nearly all housing is in multi-story buildings. In addition, the centre zone differs from the rest of the metropolitan region in its social structure, with a very low share of children (11% vs. the regional average of 19%), while the share of over-65s is equal to the regional average at approximately 15%. The share of social rental housing (9%) was also much lower than the regional average (20%) in 2015.

As for socioeconomic factors, mean neighbourhood NS is positively correlated with median income and negatively correlated with the share of social housing ($r = 0.38$), a possible indication of the self-selection of those with better resources to areas corresponding to their needs (Kemppainen & Tuominen, 2015; Parkes et al., 2002). Additionally, the share of social housing and the share of residents in the lowest income quintile are positively correlated ($r = 0.66$), suggesting clustering of objectively measured socioeconomic deprivation and social housing (see, e.g., Kauppinen & Mukkila, 2022).

As for physical factors, distance from the centre is reflected in residential density, with densities declining as distance from the centre grows. Median income is higher in low-density areas (38951€/pa) than in high-density areas (32679€/pa) (low density refers to more than one standard deviation below the mean density and high to more than one standard deviation above the mean). The higher SES of low-density areas is similarly reflected in lower unemployment, higher education levels, and a very low share of low-income residents. This finding suggests that density could be linked to NS through the mediating role of SES. NS is, however, similar in both low and high-density areas (4.04 and 4.05, respectively), so the factors do not appear to be as strongly linked as income. Together with SES, the share of social housing may influence NS. The share of social housing is

highest in neighbourhoods of 'average' density (22%) and particularly in small subcenters (27%).

Does density predict NS, and which factors mediate this relationship?

We illustrate the results of statistical modelling as figures. However, tables containing the regression coefficients and other information for the models can be found in Supplementary Appendix Table 2. We refer to changes in the neighbourhood-level variance when assessing how much the different factors explain differences in NS between neighbourhoods. In ordered logistic regression, this variance refers to the variance of an assumed continuous latent NS variable, so its values are not easy to interpret, and we focus on the changes between the models. All the models used the same set of respondents that had no missing values on the variables of the last model ($N = 20{,}527$ for the whole metropolitan area). For a list of all variables used in the analysis and their descriptives, please refer to Supplementary Appendix Table 1.

Figure 4 shows the results for models 1–5 as predicted probabilities of the different NS outcomes (see also Supplementary Appendix Table 2). The figure also shows the 95% confidence intervals for the predictions, and the predictions are computed only for the range of density containing 90% of the weighted cases (excluding the top and bottom 5%) to limit the uncertainty related to extreme density values in the data. A reference line pointing out the median value of residential density is also shown to aid interpretation.

In the first model, when no other factors are controlled for, there is no association between density and NS, and the remaining neighbourhood-level variance in NS is only one percent lower than the variance in the empty model (0.269). Model 2 adds the respondent's sociodemographic background factors as explanatory variables. This does not change the association: almost 60% are predicted to be relatively satisfied with the neighbourhood in all densities, and there is no clear change in the predicted shares of other answers, either.

As centrality and the building period of housing can affect density and NS, we add these potential confounders (and the building period of the respondent's dwelling) in Model 3. This brings out a relatively linear statistically significant negative association: the predicted probability of being very satisfied becomes smaller, and the probability of being not satisfied becomes larger with increasing density. Controlling the centrality is particularly important in bringing about this change, as density is high in the centre, where neighbourhood amenities are more favourable than in suburban neighbourhoods with high densities. The added variables seem important in explaining NS, as its neighbourhood-level variance is reduced by 42% from Model 2.

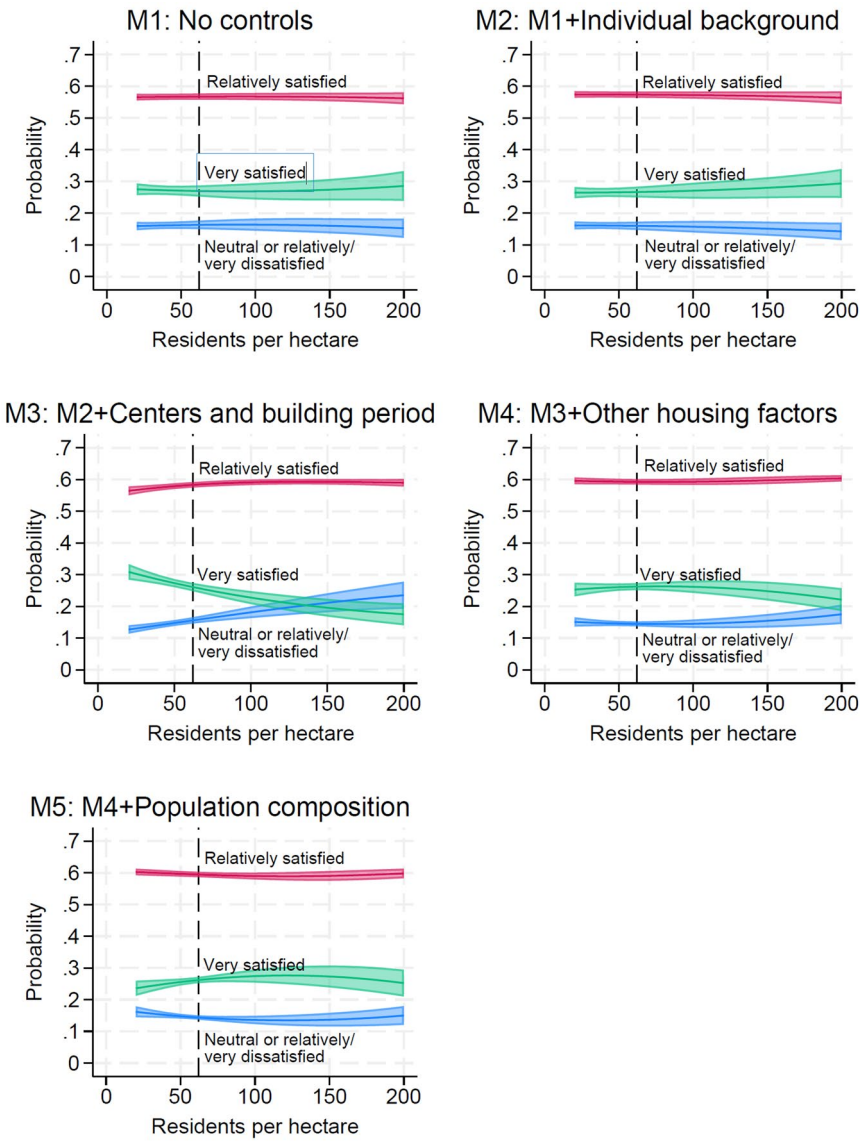

Figure 4. Predicted probabilities of NS responses by residential density in ordered logistic regression models 1–5 for the entire metropolitan area.

Results for Models 4 and 5 show whether the negative association between density and NS that appeared in Model 3 remains after controlling for the neighbourhood's housing stock and population composition. Model 4 adds the percentage of state-subsidised rental housing in the neighbourhood and the respondent's housing tenure and housing type. This considerably attenuates the association between density and NS. Therefore,

the negative relationship between density and NS (unrelated to centrality and other factors controlled for in the previous models) is strongly related to the housing stock.[11] In this model, a higher share of state-subsidised rental housing, other tenures besides homeownership, and multi-story housing are associated with lower NS. Density still has a statistically significant association with NS, but this can be seen mainly as a slight decrease in satisfaction in the highest densities. The housing characteristics further improved the explanation of the neighbourhood-level variance in NS, so they do seem to have additional significance for NS beyond their association with density.

The fifth model adds a summary variable measuring the socioeconomic and ethnic composition of the population (the full results for this model are shown in Supplementary Appendix Table 3). This variable (with high values indicating larger shares of low-income and non-Western population) is negatively associated with NS, and its addition leads to a slightly *positive* association between density and NS in low and average densities. The association between the share of state-subsidised rental housing and NS vanished in Model 5, suggesting that the population composition mediates this association. Therefore, population composition may be a part of the mechanism of how housing stock mediates the association between density and NS. This could imply that the *cause* for dissatisfaction in areas of high density is their population composition (affected by the tenure structure). However, an alternative interpretation is that lower-SES groups and immigrants sort to the least popular areas that also have high density. These two population groups are known to be in a weaker position in the housing market, and the areas with the worst reputations in the region are high-density areas.

To understand whether geographic delimitations affect results, we excluded the centre (Figure 5). When looking at areas outside the centre, the negative relationship between density and NS is seen already in the first model (Supplementary Appendix Table 2). The relationship does not change in the second model but becomes slightly more pronounced in the third model, suggesting that proximity to centres has some positive aspects (e.g., service density or accessibility). The results in Models 3–5 are similar to those of the metropolitan area. However, the negative association is slightly steeper in Model 3 and vanishes more thoroughly when the housing factors are controlled for in Model 4. Controlling for the centre types and distances in the main analysis seems to be enough to consider the region's centre effect on the results. When looking only at the subcenters, the negative association between density and NS is slightly stronger than in all areas outside the centre. Otherwise, the results do not differ much.

We also analysed the whole metropolitan area with the share of dwellings in multi-story apartment buildings as an alternative density measure (Figure 6 and Supplementary Appendix Table 4). The findings are similar to the main analysis. There is no clear association between density and NS before controlling for the centrality (and building period) in Model 3, when

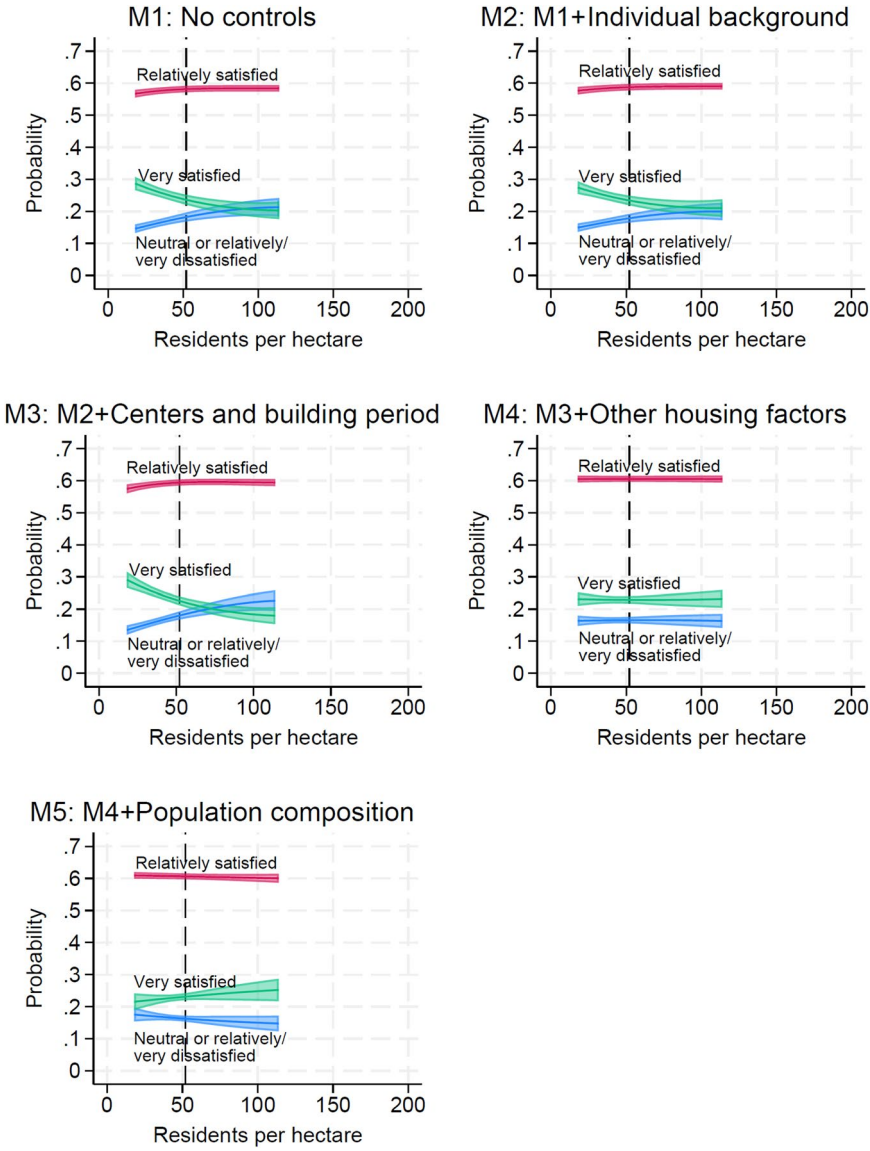

Figure 5. Predicted probabilities of NS responses by residential density in ordered logistic regression models 1–5 without the centre.

a negative association appears. This association is nonlinear, as it is not observed at lower levels of apartment share. Controlling for housing and population characteristics in Models 4 and 5 helps to explain this association. It does not vanish completely, but there is no negative association in the final model, which instead predicts a slightly lower NS in neighbourhoods with the lowest apartment shares after controlling for all factors.

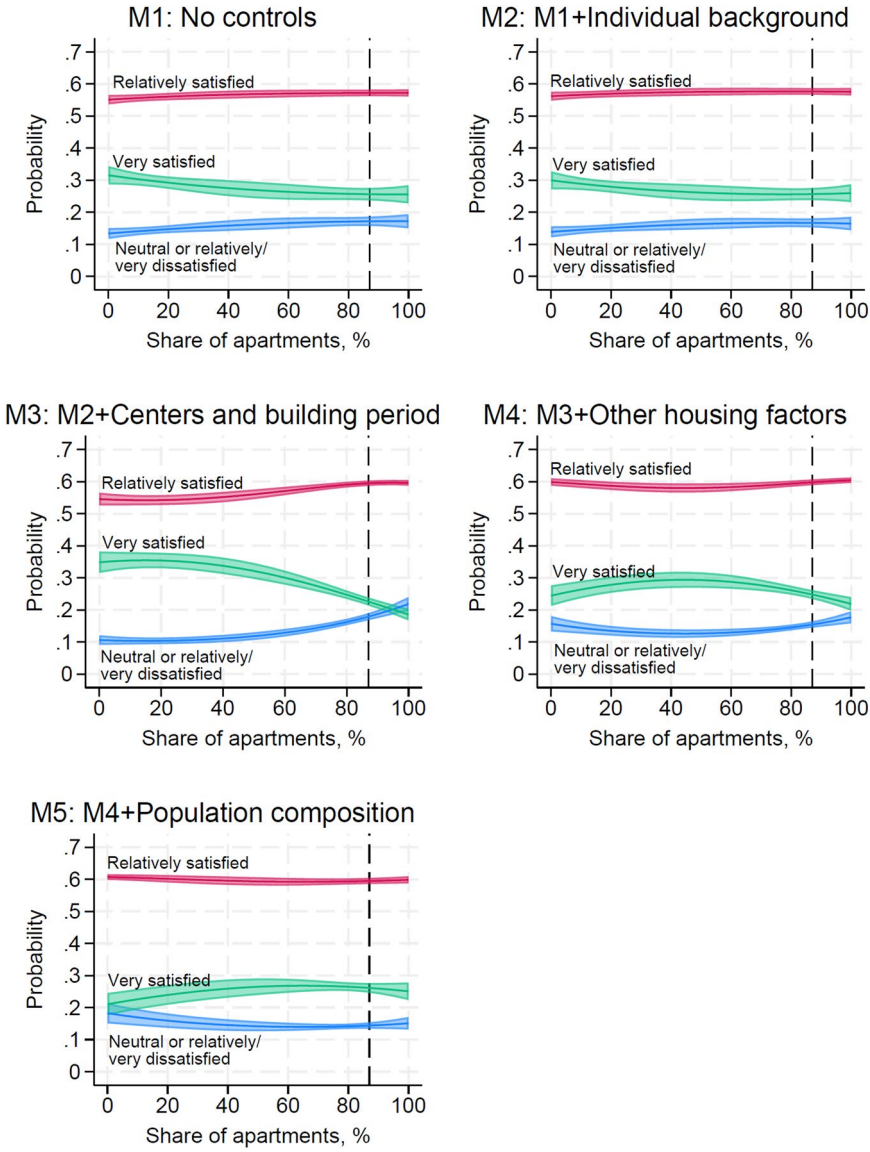

Figure 6. Predicted probabilities of NS responses by share of dwellings in multi-story apartment buildings in ordered logistic regression models 1–5.

Discussion

Our study is set in a Nordic country, where the welfare 'safety net' has equalised socioeconomic structure. Social mixing strategies implemented since the 1960s have also equalised tenure and socioeconomic structure spatially. As SES and related tenure are predictors of neighbourhood satisfaction, we expected correspondingly 'equalised' neighbourhood perceptions.

The descriptive findings show that residents of the HMA are relatively satisfied with their neighbourhood conditions, which aligns with the results of other Finnish studies (Kortteinen et al., 2005; Strandell, 2017). However, neighbourhood satisfaction varies spatially despite long-term preventive equalising measures, such as social mixing and welfare policies, as well as reactive area-based interventions. Variation in subjective well-being may reflect increasing polarisation trends in objective well-being indicators such as socioeconomic status (Kauppinen & Mukkila, 2022; Kurvinen et al., 2025), ethnicity (Hirvonen, 2019; Kurvinen et al., 2025; Saikkonen et al., 2018) and the clustering of social rental housing (see e.g., Rosengren et al., 2024).

As for the role of density, our descriptive results show that respondents living in low-rise housing were more satisfied with their neighbourhoods than those living in multi-story blocks (see e.g., Kemppainen, 2017). We also found that income was higher in low-density neighbourhoods. The regression analysis suggests that, while centres have higher neighbourhood satisfaction, presumably due to factors such as accessibility (see, e.g., Mouratidis, 2018, for Oslo), neighbourhood satisfaction drops as density increases, even after controlling for centrality. Looking only at the unadjusted association between density and NS can therefore be misleading, as the centrality of the neighbourhood can confound this association. The association between density and NS appears to be strongly linked to the neighbourhood's housing stock and population characteristics, particularly outside the central city. Therefore, density itself might not matter as much as these other characteristics associated with it. It is not clear whether this primarily indicates an effect of the (housing stock and) population composition on neighbourhood satisfaction or that lower-SES groups and immigrants sort to the least popular areas with high density. Future studies could aim to disentangle the independent contribution of density from those of associated characteristics in contexts where density is less strongly associated with them.

The focus of this study was on the neighbourhood scale. Using a large national well-being survey to measure neighbourhood characteristics and satisfaction has disadvantages: it cannot capture all questions specific to local neighbourhoods, and the survey has limited space for questions related to this topic. On the other hand, the survey had a large enough sample size to study variation between and within neighbourhoods, and it allowed the NS question to be explored within a broader framework of well-being. Methodologically, it could be better to ask more concrete questions about the perception of the respondent's neighbourhood. For example, our sensitivity analysis showed that NS is less strongly linked to the neighbourhood than more specific variables, such as perceived safety.

Conclusions

Campbell (1996) describes the planner's difficult role in addressing sustainability conflicts. In the 'planner's triangle' (1996), sustainability lies at

the balance point of the triangle. Upon revisiting the planner's triangle some twenty years later, Campbell (2016) concluded that the social dimension of this triangle remained the least defined, a 'black box'. It is difficult to achieve a balance of the triangle if one dimension remains undefined. The current planning paradigm of densification has been seen as a tool for achieving sustainability, but there is growing concern about its societal impacts. In this article, we take a social perspective and examine the role of density in neighbourhood satisfaction.

The effects of the residential environment on individuals are one justification for planning sustainable, socially just neighbourhoods. Understanding density's role in residents' perceptions of neighbourhoods is crucial when considering the societal implications of the current planning paradigm of densification. We argue that densification strategies should consider societal impacts in the long term, to prevent unintendedly amplifying segregation development and undermining desegregation policies. Subjectively measured outcomes, such as neighbourhood satisfaction, can contribute to understanding segregation dynamics and inform local land-use planning and desegregation policies. This is particularly true during periods of rapid physical and social change, such as those the HMA currently faces. For example, planners and other actors in urban development could aim to develop dense areas in ways that also attract higher-income residents and suburban areas by improving opportunities for lower-income residents to move to these neighbourhoods.

Residential perceptions could first be applied to urban policies that affect segregation. Identifying patterns of neighbourhood dissatisfaction may help target areas at risk of outward movement by the well-off. Similarly, identifying social groups with lower satisfaction levels may help target people-based initiatives. Because social mixing forms a cornerstone of Finnish segregation management and is used preventively, particularly in Helsinki, our result on the link between tenure and neighbourhood satisfaction is worrying. Gaps in neighbourhood satisfaction across tenure groups risk fuelling growing socioeconomic segregation within neighbourhoods, as tenures still cluster geographically. It is known that, for example, social housing is concentrated in the HMA (see e.g., Rosengren et al., 2024) and that social mixing faces many institutional and social barriers (Rasinkangas et al., 2024). Therefore, analysing and overcoming these obstacles could be one way to equalise objective and subjective differences across neighbourhoods, although NS differences are likely to persist despite desegregation measures.

Secondly, knowledge of residential perceptions can inform land-use policy. Our results show that neighbourhood satisfaction and socioeconomic status are lower in peripheral areas with social housing and limited access to services (see e.g., Bailey & Minton, 2018 on the suburbanisation of poverty). While centres may compensate partially for the dissatisfaction in dense neighbourhoods, fringes do not enjoy the same level of

transportation and services, and in these areas, service levels have deteriorated further recently (Rönnberg et al., 2023). This highlights the need for more careful consideration of subjective well-being in densifying peripheral areas. Considering that densification strategies in the HMA target accessible areas outside of the centre where socioeconomic status is already lower (see e.g., Rosengren et al., 2024), this concern is particularly acute. While the middle classes' mobility patterns are an important target of segregation policies, it is equally important to understand the im(mobility) patterns and perceptions of those who stay in vulnerable neighbourhoods. The active use of area-based initiatives targeting deprived areas, indicates the apparent (unacceptable) neighbourhood differences in the need for social and physical interventions. Dense suburban neighbourhoods with lower SES should therefore remain targets of area-based interventions to achieve spatial justice and counteract the trend of service concentration.

Theoretically, the article links neighbourhood satisfaction with neighbourhood effects theory, which has predominantly focused on objective rather than subjective outcomes, despite subjective outcomes such as neighbourhood satisfaction playing important roles in the segregation process. This enables a more comprehensive view of the interrelations among urban factors (such as density) and individual outcomes (such as neighbourhood satisfaction), as well as between objective and subjective dimensions. Understanding residential (im)mobility patterns and underlying factors is crucial to managing deepening segregation. Subjective neighbourhood perceptions have played a role in the Finnish segregation process, influencing detrimental sorting patterns of the affluent middle class (Vilkama et al., 2013). Polarising neighbourhood perceptions may also serve as an early indicator of residential segregation if negative neighbourhood experiences later manifest in selective movement patterns. Segregation in the metropolitan area's main three municipalities has increased throughout the 2000s as measured by income, ethnicity, and education (Kurvinen et al., 2025). As a result of the recent marketisation of Finnish housing policy (Ruonavaara, 2017) and land use (Hyötyläinen & Haila, 2018), public governance has fewer opportunities to counteract selective mobility patterns. Segregation in the metropolitan area can be argued to have spread from residential to other life domains: basic services, such as schools (Bernelius & Vilkama, 2019), workplaces (Sinitsyna et al., 2021) or daily mobility (Rönnberg, 2020). At a later stage, segregation may spread across generations (Galster & Wessel, 2019; Tammaru, Knapp et al., 2021; Tammaru et al., 2017; Van Ham et al., 2018), affecting upward mobility both socially and spatially (Nieuwenhuis & Hooimeijer, 2016), and impacting the rigidity of socio-spatial structures (Nieuwenhuis et al., 2020). From a policy perspective, each stage requires an increasing effort to slow the downward spiral.

Notes

1. For example, Galster (2012) places neighborhood services under geographical mechanisms but argues that the policies affecting the quality (and their existence, author's note) are institutional mechanisms that affect neighborhood characteristics from the outside.
2. HMA consists of four core municipalities: Helsinki, Espoo, Vantaa and Kauniainen. The population of the wider Helsinki region (14 municipalities) is 1.6 million.
3. The share of units in multi-story buildings is approximately 55% in the HMA, but it is closer to 90% in new housing production.
4. In 2015, these 255 neighborhoods had 4200 residents on average. The number of respondents by neighborhood ranges from 3 to 394, with 82 respondents on average.
5. The center has a smaller share of children (11% vs. a regional average of 19%).
6. The data collection was based on stratified random sampling, and survey weights accounting for the stratified design and non-response were included in the original data. For this analysis, post-stratification weights were created from the original weights to account for the multi-year data collection and restriction of the dataset to the Helsinki metropolitan area, and the municipality, district, year, and age group defined the strata. These weights were used in all analyses.
7. License TK/2958/07.03.00/2021.
8. A limitation to the data is that we were not able to obtain respondents' income from registers and rely on their self-reported employment status.
9. The "non-Western" group refers primarily to immigrants from Africa, Asia and the Cold War era Eastern bloc countries in Europe.
10. Satisfaction with quality of life (QOL, std. dev. 0.16) varied less than NS (std. dev. 0.23) on a neighborhood level, confirming that the NS variable reflected variation in spatial conditions more than the more general quality of life measure.
11. None of the added housing characteristics brings out the change alone, but they all contribute to it. As also the housing type of the respondent contributes to explaining the negative association between density and NS, part of the explanation can be seen to be related to the share of apartments, although it is not controlled at the neighborhood level due to its strong correlation with density.

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